
CD13 and ROR2 Permit Isolation of Highly Enriched Cardiac Mesoderm from Differentiating Human Embryonic Stem Cells.

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Public Summary:

The generation of tissue-specific cell types from human embryonic stem cells (hESCs) is critical for the development of future stem cell-based regenerative therapies. Here, we identify CD13 and ROR2 as cell-surface markers capable of selecting early cardiac mesoderm emerging during hESC differentiation. We demonstrate that the CD13⁺/ROR2⁺ population encompasses pre-cardiac mesoderm, which efficiently differentiates to all major cardiovascular lineages. We determined the engraftment potential of CD13⁺/ROR2⁺ in small (murine) and large (porcine) animal models, and demonstrated that CD13⁺/ROR2⁺ progenitors have the capacity to differentiate toward cardiomyocytes, fibroblasts, smooth muscle, and endothelial cells in vivo. Collectively, our data show that CD13 and ROR2 identify a cardiac lineage precursor pool that is capable of successful engraftment into the porcine heart. These markers represent valuable tools for further dissection of early human cardiac differentiation, and will enable a detailed assessment of human pluripotent stem cell-derived cardiac lineage cells for potential clinical applications.

Scientific Abstract:

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